Models for Population Heath

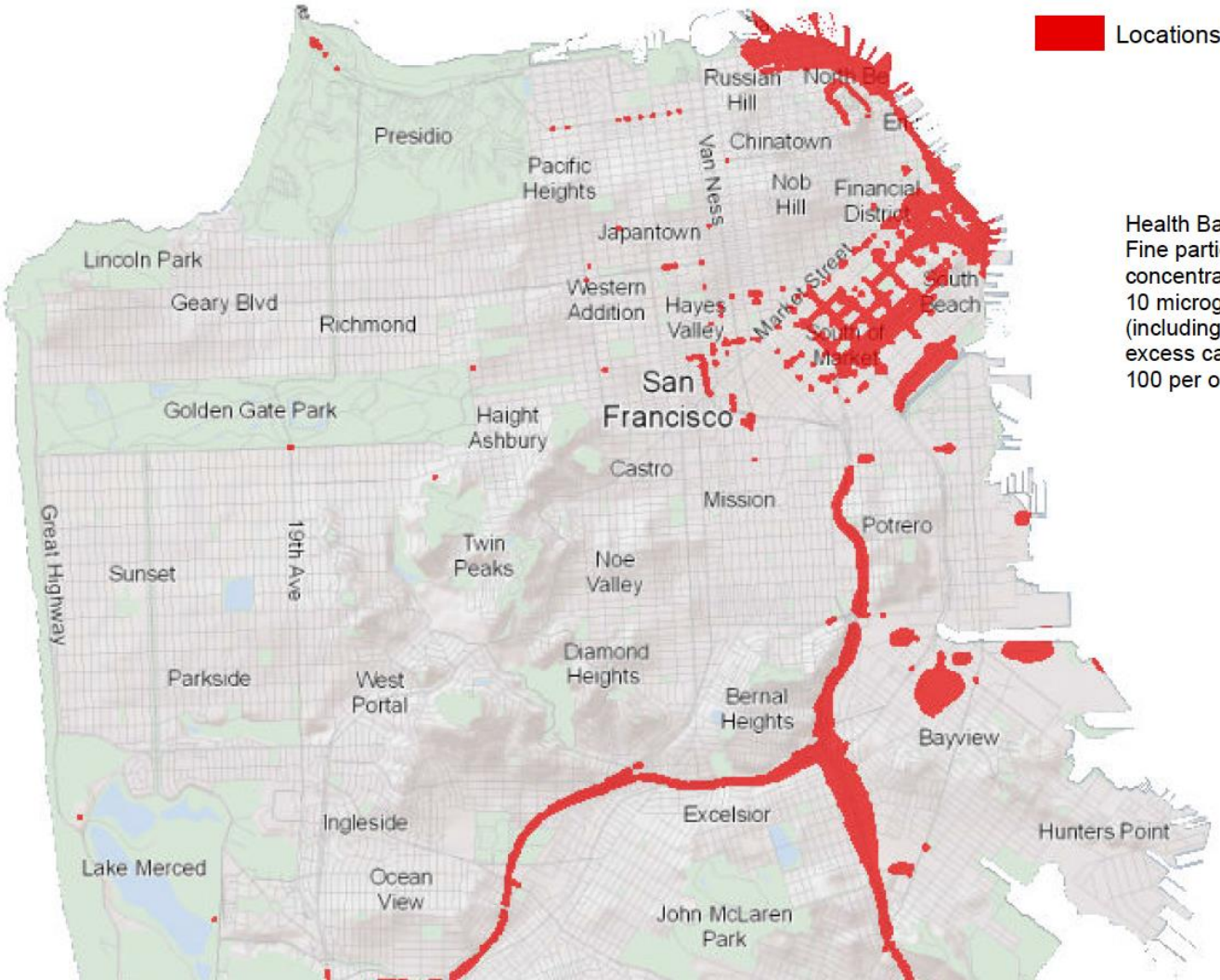
Observations on Model Design
and Information Value from Health
Impact Assessment Practice

Health Impact Assessment (HIA) is a trans-disciplinary decision-support practice that anticipates the health effects of a decision prospectively.

HIA aims to serve the knowledge needs of democratic decision making.

HIA uses conceptual models to explain the nexus between policy and health and to quantify decision impacts on health determinants and outcomes.

Air Pollution Health Risks



Locations Exceeding Health Standards

Health Based Standards:
Fine particulate matter (PM2.5) concentrations greater than 10 micrograms per cubic meter (including background levels) and excess cancer risk greater than 100 per one million people exposed

Modeling Air Pollution Health Risks

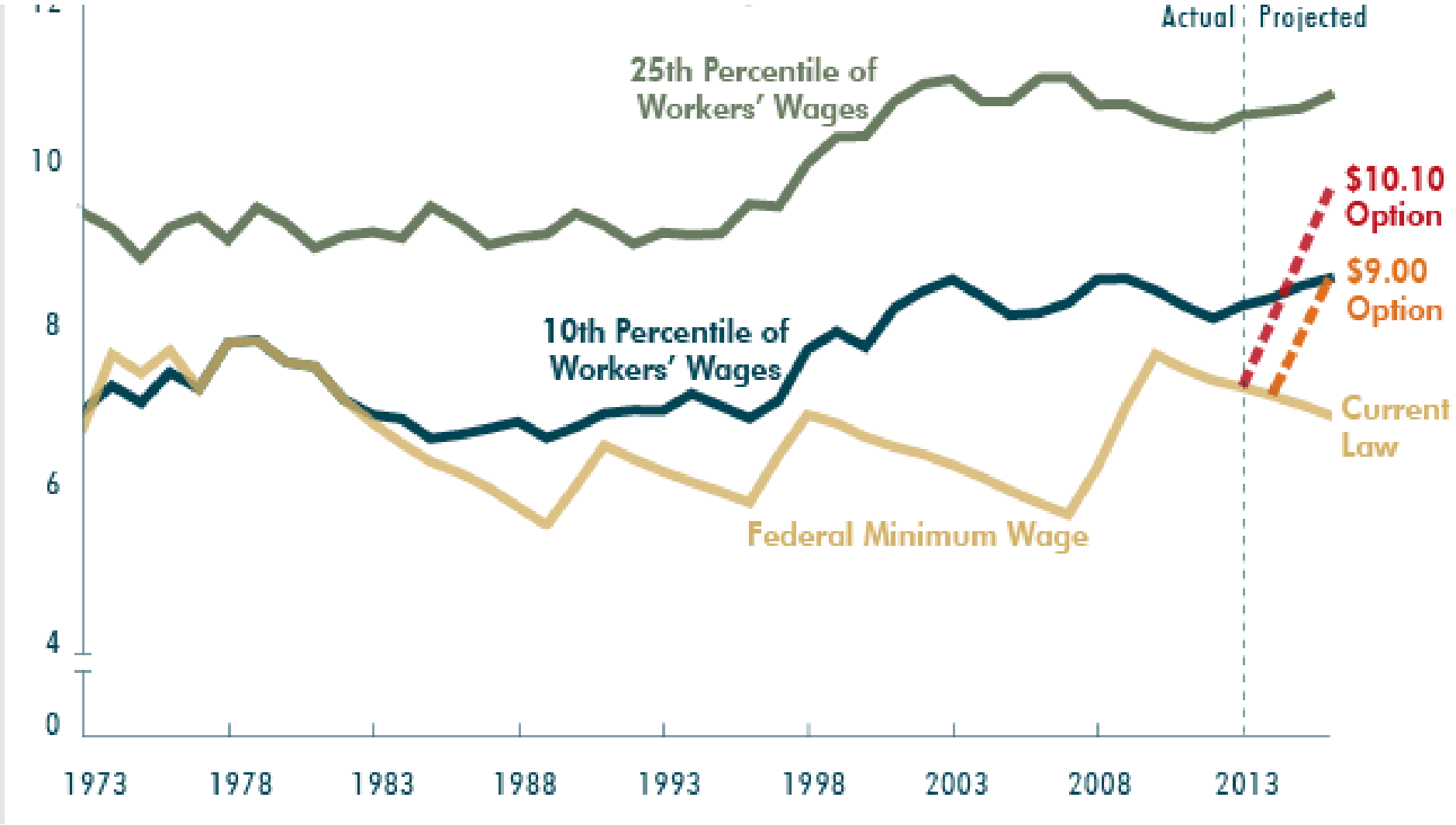
Outcomes	**Ambient Particulate Matter / All-cause Mortality**
Exposure Model	**Physical dispersion**
Mortality Model	**Logistic Regression**
Inputs	**Air Pollution Emissions, Meteorology, Crude mortality, Exposure-response function, Population**
Validation	**Field Air Pollution Measures**
Applications:	**Land use regulation; Road Pricing; Weatherization programs;**

Pedestrian Injuries & Fatalities

Modeling Pedestrian Injuries

Outcomes	**Pedestrian Injuries & Fatalities**
Type	**Binomial Regression**
Predictors	**Vehicle and pedestrian volumes; traffic speed; road and intersection characteristics; area population characteristics**
Validation	**Police Reported Injuries**
Applications	**Traffic Engineering; Land Use Regulation; Road Pricing; Infrastructure Funding**

Minimum Wage Health Impacts



Modeling Minimum Wage Health Impacts

Outcome	**Avoidable Mortality**
Income Model	**OLS Regression**
Mortality Model	**Logistic Regression**
Inputs	**Minimum wage rate; income distribution; income-mortality exposure-response function**
Validation	**None**
Applications	**Wage and Tax Policy**

Data and science do not usually have lead roles in public policy; applications of HIA and modeling were opportunistic and focused on timely policy issues.

Modeling in HIA is purpose driven; modeling sought to provide missing and actionable data valued in the decision calculus.

Data audiences were *both* agency officials and community constituencies!

Application and innovation “joined up” models of health determinants and health outcomes.

Simple models worked best; low specificity and long latency of the determinant-outcome relationship may lower the credibility of model predictions.

Information value arose from explicitly linking policy choices and health outcomes; from legitimizing community arguments; from attributing and localizing risks; and from supporting policy implementation.

We are very far off from modeling the social production of health across the life-course.

Current inquiry on population health determinants (“risk factors”) are disconnected from the outcomes of policy decisions.

Knowledge useful for prevention and public policy could benefit from population health information systems that integrate clinical outcomes with individual-level, social, economic, and environmental factors.

Starting points for model builders: What information could make a better decision? Who wants the information? How will they use it?

Building useful models is an iterative and collaborative process with users.

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